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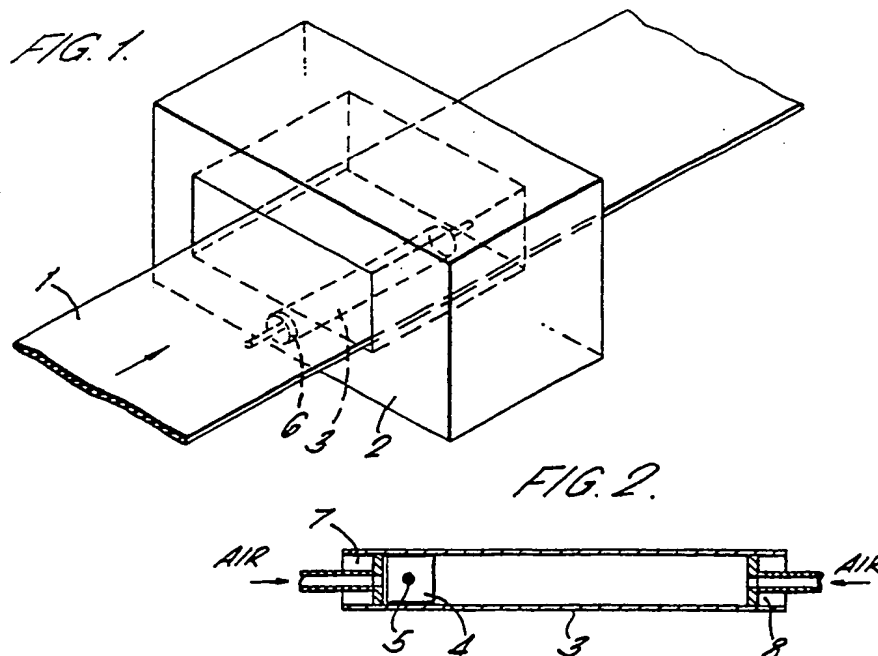
(58) Field of search

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(54) Metal detecting apparatus and apparatus for testing metal detecting apparatus

(57) Apparatus for testing metal detecting apparatus employs a test piece of representative metal which is passed through a section of the electromagnetic field of the metal detecting apparatus to record a response signal as if metal had been detected. The testing apparatus comprises the test piece (5) and a housing (3) for the test piece which extends through said section of the electromagnetic field and acts to guide the test piece along its path, said movement of the test piece causing distortion of the electromagnetic field and actuation of the detecting mechanism to give the required signal. Housing (3) may be in the form of a non-magnetic tube mounted on the bottom of yoke (2), test piece (5) being a metal piece embedded in non-magnetic slug (4). Slug (4) is moved to and fro along tube (3) by air pulses applied alternately to opposite ends of the tube. Housing (3) may comprise a passageway extending through the coil encapsulation. The coil and tube (3) may be moulded together into a thin rectangular solid mounted underneath conveyor (1).



METAL DETECTING APPARATUS AND APPARATUS
FOR TESTING METAL DETECTING APPARATUS

5 This invention relates to apparatus known as
metal detecting apparatus and apparatus for testing
metal detecting apparatus.

10 Metal detecting apparatus is conventionally used
in the food and pharmaceutical industries, and also in
other fields such as the survey of subterranean
objects. A particular example is for the detection of
metal which may be present, usually accidentally, in
substances such as foodstuffs which may be liquid or
solid and which are intended to be free of metal. The
foodstuffs or other substances may be conveyed
15 continuously, e.g. either as a stream of packages or
as an unpacked but substantially continuous volume of
liquid or dry material in granular form which may vary
from fine powder to granules of any size convenient to
the conveying means. Such substances may be carried
20 by pipes or suitably shaped conveyor belts.

Also, metal detecting apparatus is frequently of
a form in which the detecting means is based on the
provision of an electromagnetic field which is
arranged to surround the substance or product being
25 conveyed. Alternatively, the electromagnetic field
may be generated closely adjacent to the conveying
means. Sensing means within the apparatus detects any
transient distortion of the electromagnetic field
which will occur if a metal object should pass through
30 the field. In this event, a warning signal may be
generated or other action may be taken as necessary or
desired. However, the above detecting means are
described only by way of example, and the present
invention is also applicable to any other metal
35 detecting means, e.g. apparatus in which the product
is stationary.

material, a non-magnetic stainless steel, copper or aluminium.

It is also preferred that means are provided for blowing the test piece through the guide housing.

5 For metal detecting apparatus intended for detecting metal in moving product, the guide housing preferably extends longitudinally of the product path.

The invention also provides metal detecting apparatus including testing apparatus as defined above.

10 In the case of the metal detecting apparatus being used for detecting metal in moving product, the metal detecting apparatus may define an aperture containing the product path, the guide housing extending along a separate path which is distinct from
15 the product path. Alternatively, the metal detecting apparatus may be employed adjacent the product path, the guide housing extending along a separate path which is distinct from the product path.

20 The guide housing may extend through, e.g. be moulded into, the encapsulation of the coil of the metal detecting apparatus.

25 By way of example, specific embodiments in accordance with the invention will be described with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is a perspective view of a conveyor belt passing through metal detecting apparatus having testing apparatus therefor;

30 Figure 2 is a side elevation of the apparatus of Figure 1;

Figure 3 is a section through the testing apparatus; and

35 Figure 4 shows a second embodiment of metal detecting apparatus having the same testing apparatus as in the first embodiment.

Referring to Figures 1 to 3, metal detecting

introduced through tubular junctions 7, 8 mounted in respective ends of the tube. Conventional blow means (not shown) are provided to generate the air pulses. When the slug 4 moves from one end of the tube 3 to the other, it moves from one side of the yoke 2 to the other. The normal rest position of the slug 4 is at the left-hand end of the tube 3 (Figures 2 and 3). Upon the application of pulses of air first through junction 7 and then through junction 8, the slug will travel from left to right and then from right to left and should travel from one side of the yoke to the other side and then back again. As the slug moves it generates corresponding responses to the apparatus sensing means.

The control means for generating the pulses of air pressure through the end junctions 7, 8 include reversible valve means (not shown) which may be arranged to operate, say, every 15 or 30 minutes, or whenever is most convenient to an operator so that the apparatus is checked at these intervals.

The size of the test piece 5 in the slug 4 may be varied according to the sensitivity of the testing means, and the test piece may be made of different materials depending on the nature of the contaminant anticipated in the product. In this embodiment, the test piece 5 is a sphere of stainless steel.

As illustrated, the guide tube 3 is mounted close to the bottom of the yoke, but it may be fixed in any desired position relative to the yoke. For example, if the space taken up by the product being conveyed allows, the tube 3 may extend through the aperture of the yoke. Also, the guide tube 3 is shown in a horizontal attitude, but if desired the yoke 2 and/or the guide tube 3 may be fixed in an inclined or vertical attitude relative to the yoke if this is necessary or more convenient. Movement of the slug 4

back again. As the slug 4 moves through the electromagnetic field, the test piece 5 distorts the field and generates corresponding responses in the apparatus sensing means.

5 Also, as in the previous embodiment, use of the slug containing the test piece does not interfere with the passage of the materials on the conveyor belt.

10 The response signal given in consequence to the movement of the slug 4 along the tube 3 indicates that the metal detecting apparatus is operative. If desired, control means may be provided whereby the response signal may also be employed to recalibrate the metal detecting apparatus as required.

15 It will be appreciated that the testing apparatus described above may be employed in combination with metal detecting apparatus already in use by suitable attachment of the guide tube 3 or other housing to the yoke or other member creating the electromagnetic field, instead of being moulded into the metal
20 detecting apparatus.

 In other cases in which the testing apparatus is designed as a integral part of the metal detecting apparatus, the guide housing for the slug 4 may
25 comprise a simple aperture or passageway extending through the encapsulation of the coil rather than a preformed housing, e.g. the above described tube 3, moulded into the encapsulation or attached thereto.

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7. Metal detecting apparatus as claimed in Claim 6
for detecting metal in moving product, wherein the
metal detecting apparatus defines an aperture
5 containing the product path, the guide housing
extending along a separate path which is distinct from
the product path.

8. Metal detecting apparatus as claimed in Claim 6
10 for detecting metal in moving product, wherein the
metal detecting apparatus is employed adjacent the
product path, the guide housing extending along a
separate path which is distinct from the product path.

9. Metal detecting apparatus as claimed in any one
15 of Claims 6 to 8, wherein the guide housing extends
through the encapsulation of the coil of the metal
detecting apparatus.

10. Testing apparatus substantially as hereinbefore
20 described with reference to and as shown in the
accompanying drawings.

11. Metal detecting apparatus substantially as
25 hereinbefore described with reference to and as shown
in the accompanying drawings.

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